calculations are founded are more uncertain than at ordinary temperatures; thus confirming the opinion of Laplace, who says, in speaking of these differences, "qu'elles paraissent être dans les limites des petites erreurs dont cette expérience, et les élémens du calcul, dont j'ai fait usage, sont encore susceptibles." The author shows by an elaborate calculation, that the influence of moisture in the atmosphere on the velocity of sound must at these two temperatures be quite trifling, not amounting in any case to more than a few inches in a second; and that this element may therefore be safely neglected in the computation. He next proceeds to compare the experiments of the northern navigators with those of Dr. Van Beck and himself, and also those of other observers, adverting to their general agreement; which, he observes, is sufficiently satisfactory to warrant the conclusion, that whatever difference may still be found to exist between computation and observation, is rather to be ascribed to some imperfection in the theoretical formula, than to any fault or negligence in the observers. He concludes by remarking the strong testimony which Captain Parry's observations afford of his exemplary accuracy, amidst the great difficulties with which, from the circumstances in which he was placed, he had generally to contend.

An Account of a Series of Experiments made with a view to the Construction of an achromatic Telescope with a fluid concave Lens, in stead of the usual Lens of Flint Glass. In a Letter addressed to Davies Gilbert, *Esq. M.P. President of the Royal Society. By* Peter Barlow, *Esq. F.R.S. &c.* Read January 17, 1828. [*Phil. Trans.* 1828, *p.* 105.]

The idea of constructing achromatic telescopes with fluid lenses was first suggested to the author by the attempt of Messrs. Gilbert to apply to practice the principles and rules for the construction of aplanatic object-glasses, laid down by Mr. Herschel in the Philosophical Transactions for 1821. In following these suggestions, the author became sensible of the difficulty of obtaining flint glass of sufficient size and purity for astronomical telescopes; and was thence led to consider the possibility of substituting some fluid in place of flint glass. Dr. Blair had, many years ago, succeeded in making very perfect telescopes of this description, but he still retained the use of flint glass. Among the various fluids adapted to this optical purpose, the author gave a decided preference to the sulphuret of carbon, which combines properties of perfect transparency and freedom from colour, with a refractive index nearly equal to that of flint glass, and with a dispersive power more than double, properties which it appears to retain under all the temperatures to which it is likely to be exposed in an astronomical telescope. After several trials, Mr. Barlow determined the best method of confining this fluid, but was at first unsuccessful in his attempts to construct with it a telescope of 6 inches aperture and 7 feet in length. He afterwards undertook a smaller one of 3 inches aperture, which he at length accomplished, and in the very first trials with it was able to separate a great num-

ber of double stars of the class which Sir William Herschel has pointed out as tests of a good $3\frac{1}{2}$-inch refractor. Encouraged by his success, he again attempted a 6-inch object-glass, with a different manner of adjusting and securing the lenses, and considers the result of his endeavour as proving at least the practicability of the construction. This instrument, with a power of 143, shows the small star in Polaris so distinct and brilliant, that its transit might be taken with the utmost certainty; it exhibits distinctly the small stars in α Lyræ, Aldebaran, Rigel, &c. and decidedly separates Castor, γ Leonis, and ϵ Bootis. The belts and double ring of Saturn are well exhibited with a power of 150; and the belts and satellites of Jupiter are tolerably defined with the same power, but will not bear a higher power than about 200.

In the usual construction of achromatic telescopes, the two or the three lenses composing the object-glass are brought into immediate contact. But the high dispersive power of the sulphuret of carbon enables Mr. Barlow to place the fluid correcting lens at a distance from the plate object lens equal to half its focal length. By this means the fluid lens, which is the most difficult part of the construction, is reduced to one half or less of the size of the plate lens. This construction, therefore, renders us independent of flint glass, enables us to increase the aperture of the telescope to a considerable extent; and gives us all the light, field, and focal power of a telescope of one and a half time the length of the tube. The author investigates analytically the formulæ for calculating the proper distance of the lenses on this construction, and expresses a hope that further experiments will enable us to determine the precise distance which shall reduce what has been termed the secondary spectrum, inseparable from the ordinary construction, either to zero, or to an inconsiderable amount.

A Catalogue of Nebulæ and clusters of Stars in the Southern Hemisphere, observed at Paramatta in New South Wales, by James Dunlop, *Esq. In a Letter addressed to Sir* Thomas Makdougall Brisbane, *Bart. K.C.B. late Governor of New South Wales. Presented to the Royal Society by* John Frederick William Herschel, *Esq. Vice President.* Read December 20, 1827. [*Phil. Trans.* 1828, *p.* 113.]

The observations, of which the results are here given, were made by Mr. Dunlop in the open air, with a 9-feet reflecting telescope, having the clear aperture of the large mirror 9 inches, and fitted up as a meridian telescope; the position of which, and the index error, being ascertained by the passage of known stars. The drawings which accompany the paper were made at the time of observation of the appearances of a great number of nebulæ and clusters, and particularly of the nebulæ major and minor. The paper contains a catalogue and description of 629 nebulæ, arranged in the order of their south polar distance, and in zones for each degree in the order of their right ascension. A few observations are subjoined, describing more particularly the appearance of the nebula minor, which,